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UNITED STATES PATENT APPLICATION

of

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and

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for

WEIGHT LIFTING SYSTEM WITH

INTERNAL CAM MECHANISM

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BACKGROUND OF THE INVENTION

Field of the Invention

[001] This invention is in the field of weight lifting equipment. More specifically, this invention relates to a weight lifting system, e.g., a dumbbell or barbell system, with an internal cam mechanism.

The Relevant Technology

[002] Hand-held weights such as barbells and dumbbells have been used for many years by exercisers engaging in weightlifting. Some hand-held weight systems include a bar configured to removably receive a variety of different weights which slide onto the bar. Other weight systems include a handle and disks integrally attached on opposing sides of the handle.

[003] It is common for commercial gyms and home gyms to include barbells or dumbbells which are stored on a bench or on the floor. These hand-held weights are used for exercises such as a military press to strengthen the upper body, curls to strengthen the biceps, and squats to strengthen the upper and lower body. Sometimes dumbbells are held while jogging or running in place to enhance the exercise experience.

[004] While lifting a weight which is too small may not provide the adequate training desired by a user, lifting a weight which is too heavy may strain or injure the user. The exerciser may be interested in lifting a lighter weight on one day, then ramp up to a heavier weight on another day. Thus, for the sake of safety and for the appropriate amount of exercise, it is useful to provide a variety of options for the exerciser.

[005] In order to permit a number of different users to lift handweights, it is common for gyms to provide a variety of different weights and sizes of integral or adjustable weights. Despite the advantages of having a variety of different handweights, however,

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providing an assortment of different handweights is expensive and increases the amount of storage space required. In order to use space more efficiently, gyms typically include a shelf or cabinet for receiving differently-sized handweights.

[006] In the event a weight bench or cabinet is not employed, the user is often forced to leave the weights on the floor, which is a highly inefficient use of space and provides a cluttered appearance. Thus, in order to use space more efficiently, the user is required not only to purchase the assortment of handweights but must also purchase a bench or cabinet for storing the various handweights.

[007] Another problem within the art is that it is often cumbersome to mount weights onto a bar. Weights sometimes include holes therein and are disposed about the bar without being otherwise secured to the bar. One disadvantage with these weights is that it is possible for one or both of the weights on opposing sides of the bar to fall off. This can be inconvenient or even dangerous for the user or for a person adjacent to the user such as a spotter or coach.

[008] For example, if the exerciser is lying on a bench performing a military press and a weight on one side of a bar falls off the bar, the weight on the other side of the bar causes the bar to tip toward the weighted side. If this action occurs suddenly, the non-weighted side can be quickly thrust toward the weighted side, possibly causing injury or damage.

[009] In other embodiments, weights are prevented from falling from a bar through the use of screws disposed through circular brackets coupled outside the weights to the bar. These mechanisms, however, are often inconvenient to mount onto the bar and remove from the bar. Each of these mechanisms must be placed onto the bar separately and on opposing sides of the bar. Another problem within the art is the expense of purchasing

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separate pieces of equipment for each different weight desired to be used by the weightlifter.

[010] One product known as the POWERBLOCK attempts to provide a selectorized dumbbell which allows a user to select a desired weight to be lifted from a set of stacked weights. A user inserts a core having an internal band grip into a set of stacked weights, then selects a desired number of weights using a selector pin.

[011] The POWERBLOCK however, interferes with the natural movement of the user's wrists and has an unusual rectangular block appearance. The user must reach into the rectangular structure to pick up the weights. As a result, the rectangular structure can inconveniently contact the wrists during use. In addition, the removable selector pin can be lost or misplaced and is inconvenient to orient into and remove from the weights. The pin must also be mounted from a location remote from the location where the practitioner grasps the handle.

[012] It would therefore be an improvement in the art to provide a weightlifting system that is convenient to use and store and enables convenient adjustment of the amount of weight thereon.

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BRIEF DESCRIPTION OF THE DRAWINGS

[013] To further clarify the above and other advantages and features of the present invention, a more particular description of the invention will be rendered by reference to specific embodiments thereof, which are illustrated in the appended drawings. It is appreciated that these drawings depict only typical embodiments of the invention and are therefore not to be considered limiting of its scope. The invention will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

[014] Figure 1 is an exploded view of a weightlifting system of the present invention in the form of a dumbbell.

[015] Figure 2A is a perspective, assembled view of the dumbbell of Figure 1.

[016] Figure 2B is a cross-sectional view of the dumbbell of Figures 1 and 2A.

[017] Figures 3A and 3B are perspective and side views, respectively, of a locking mechanism of the dumbbell of figures 1-2A.

[018] Figure 4A is a perspective cross sectional view of the locking mechanism of Figures 3A-3B.

[019] Figures 4B-4C are respective cross-sectional views of the locking mechanism of Figure 4A, the cam follower of Figure 4B being shown in a locked position, and the cam follower of Figure 4C being shown in an unlocked position.

[020] Figure 5 is an exploded view of the locking mechanism of Figures 3A-4C.

[021] Figure 6A is a perspective view of a cam follower of the embodiment of Figures 1-5 shown in a perspective view.

[022] Figure 6B is a depiction of the cam follower of Figure 6A shown in a side view.

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[023] Figure 6C is an end view of the cam follower of Figure 6A.

[024] Figure 6D is a top view of the cam follower of Figure 6A.

[025] Figure 7A is a perspective front view of a weight plate of the invention of Figures 1-2B.

[026] Figure 7B is a perspective rear view of the weight plate of Figure 7A.

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DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[027] With reference now to Figures 1-2B, a weight lifting system 10 of the present invention is shown. Weight lifting system 10 comprises a handle 12, a plurality of weights 14a-14b, 16a-16b, and first and second respective opposing locking mechanisms, 18a-18b, selectively coupling weights 16a-16b to opposing ends of the handle 12. Figures 2A-2B include additional plates 17a-19b.

[028] As one novel feature of the present invention, locking mechanisms 18a, 18b each feature a respective rotating cam follower 22a, 22b. Thus, each locking mechanism 18a, 18b can be conveniently, selectively coupled to opposing ends of handle 12, thereby coupling weights 16a-16b to handle 12. More specifically, by manipulating locking mechanisms 18a-18b, into a desired position, each respective cam follower 22a, 22b, can be selectively rotated into (i) a locked position such that the weights 16a-16b (and additional weights 17a-19b if desired) are locked against handle 12 or (ii) into an unlocked position such that the weights can be selectively removed from handle 12.

[029] Cam followers 22a, 22b are each a threaded cam follower configured to selectively engage mating spiraling threads on the interior surface of handle 12 such that locking mechanisms 18a, 18b can be selectively coupled to handle 12 with the weights sandwiched between respective locking mechanisms 18a and 18b and opposing ends of handle 12.

[030] Weight lifting system 10 is convenient for a variety of reasons. First, a user can selectively, conveniently remove one or both locking mechanisms 18a, 18b from handle 12 by either (i) threading the threads of cam followers 22a, 22b out of handle 12 or by (ii) manipulating one or more cam followers 22a, 22b to an unlocked position such that the

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locking mechanisms 18a and/or 18b can be pulled quickly out of handle 12. In addition, locking mechanisms 18a, 18b can be readily placed into handle 12 either by threading cam followers 22a, 22b into opposing ends of handle 12 or by actuating the cam followers into an unlocked position and pressing the locking mechanisms 18a, 18b quickly and conveniently into a desired position within handle 12, then allowing the cam followers 22a, 22b to move to a locked position. Furthermore, locking mechanisms 18a-b can be retained within handle 12 and cam followers 22a-b can be retained in a locked position by tightening the threaded cam followers 22a-b against the internal threads of handle 12. Such tightening can be reversed when it is desired to either thread mechanisms 18a-b out of handle 12 or quickly release them by moving the cam followers 22a-b to an unlocked position.

[031] The elements of system 10 will now be discussed in additional detail. As shown in Figures 1, 2a, and 2b, handle 12 comprises a cylindrical grip 30 and first and second opposing, enlarged hollow mounting platforms 32a, 32b extending from opposing ends of grip 30. Mounting platforms 32a, 32b each have a threaded receiving member 34a, 34b and an annular shoulder 36a, 36b adjacent thereto, respectively. Platforms 32a, 32b thus threadedly receive first plates 14a, 14b thereon before additional plates are coupled to handle 12. As shown, first plates 14a-b have large threaded interior diameters 38a, 38b, respectively, such that the interior diameters selectively thread onto respective opposing platforms 32a, 32b of handle 12. Once first plates 14a-14b are mounted onto opposing platforms 32a, 32b, additional weights can then be added through the use of locking mechanisms 18a, 18b. Such additional weights have an interior diameter defining an aperture therethrough and, in the embodiment shown have a frusto-conical shape

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designed to nest with frustoconicaly shaped plates 14a-b in order to conveniently couple the weights to handle 12.

[032] The interior diameter 40 of handle 12 is threaded with spiraling threads 41 (Fig. 2B) so as to selectively, threadedly receive respective locking mechanisms 18a, 18b. Upon aligning the interior diameter of respective second plates 16a, 16b with a respective locking mechanism and with the interior diameter 40 of handle 12, elongate portions 20a, 20b of respective locking mechanisms 18a, 18b and their respective cam followers 22a, 22b can then be inserted through the interior diameter of respective second plates 16a, 16b and into the interior diameter 40 of handle 12. Third and fourth plates 17a-19b, and additional plates, may also be added in the series such that the locking mechanisms 18a, 18b couple a desired number of plates to the handle 12 as depicted in Figures 2a and 2b.

[033] As mentioned, first plates 14a-16b are frusto-conically shaped plates. The plates have a conical outer perimeter with a flat central portion that abuts respective annular shoulders 36a-b of handle. The conical portion of the plates 14a, 14b enables the first plates 14a, 14b to nest with respective additional plates added adjacent plates 14a-b. The nesting of these plates enables the plates to more securely couple to handle 12. Thus, as shown in Figures 2A and 2B, the first, second, third, and fourth plates are in a nested relationship, connected to handle 12 by respective locking mechanisms 18a, 18b. Also, as shown in Figures 1-2B, the second, third, and fourth plates are also in a frusto-conical shape such that the plates can be placed in a nesting relationship with each other and with the first plates 14a, 14b.

[034] With continued reference now to Figure 2B, locking mechanisms 18a and 18b will now be discussed in additional detail. Figure 2B demonstrates cam follower 22a in a

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locked position and cam follower 22b in an unlocked position. While cam follower 22b is in the unlocked position, locking mechanism 18b can be moved out of handle 12 in the direction of arrow 76 or can be conveniently moved into handle 12. On the other hand, while locking mechanism 22a is in a locked position, the weights 14, 16a, 17a, and 19a attached to handle 12 will not fall away from handle 12 during use of system 10.

[035] The threads of cam follower 22a of Figure 2B are depicted as being interlocked with the threads 41 on the interior surface 40 of handle 12, while the threads of cam follower 22b are depicted as not being engaged with the threads 41 of interior surface 40.

[036] It is also possible to remove locking mechanisms 18a and 18b of Figure 2B from handle 12 in different ways. While mechanism 18a is in a locked position, it can be selectively decoupled from handle 12 by loosening the engagement of handle threads 41 from cam follower threads 70 by twisting mechanism 18a with respect to handle 12, then continuing to twist mechanism 18a until mechanism 18a threads out of handle 12. Unlocked mechanism 18b of Fig. 2B, on the other hand, can be quickly, selectively removed by merely pulling mechanism 18b in the direction of arrow 76.

[037] In order to further illustrate the elements that comprise respective locking mechanisms 18a and 18b, reference will now be made to Figures 3A-5, which illustrate mechanism 18a. In one embodiment, mechanism 18a is identical or substantially similar to mechanism 18b.

[038] As shown, locking mechanism 18a comprises a cam follower 22a, a cam receiving sleeve 50, to which cam follower 22a is rotatably coupled through the use of a pin 52, a sleeve rim 44 having an annular shoulder 45 that contacts a weight plate (e.g., plate 16a), a cam push rod 54 (Fig. 4A-5), which selectively moves cam follower 22a to a

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desired position, a cam push rod handle 56, and a pin 58 coupling handle 56 to push rod 54.

[039] As depicted in Figures 4A-5, sleeve 50 and rim 44 have slots 60, 48, respectively, therein through which pin 58 extends. Pin 58 couples push rod 54 to handle 56. Pin 58 moves within slots 60, 48 when handle 56 and push rod 54 connected to handle 56 are moved with respect to sleeve 50. Slot 60 is located at a proximal end 61 of sleeve 50. Located at the distal end 63 of sleeve 50 is a notch 62. The threads 70 of cam follower 22a extend upwardly past the notched portion of sleeve 50. Push rod 54 comprises a post 64 and a lip 66 extending from the post 64, the lip 66 having a raised portion 68 at a distal tip thereof.

[040] Cam follower 22a comprises a body 74 rotatably coupled to sleeve 50 and a head 75 extending from body 74. Cam follower head 75 has threads 70 on the top thereof. Body 74 has a notched portion 72 on the bottom thereof. The rotating cam follower 22a is thus a moveable, L-shaped, member. Threads 70 are a portion of a spiraling thread pattern and selectively engage corresponding spiraling threads 41 of interior surface 40 of handle 12.

[041] As depicted in Figures 4B-4C, when raised portion 68 of push rod 54 is moved distally beneath head 75 of cam follower 22a, cam follower 22a moves into a locked position. However, when push rod 54 is moved back to a more proximal position beneath slanted body 74 of cam follower 22a, as shown in Figure 4C, the cam follower 22a is forced into the unlocked position.

[042] Thus, when the raised portion 68 of lip 66 contacts body 74, threads 70 of cam follower 22a disengage from threads 41 of handle 12. On the other hand, when raised

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portion 68 of lip 66 is disposed underneath and contacts the cam follower head 75, threads 70 can engage threads 41 in the locked position.

[043] A spring 79 (shown in Figures 4B-4C, but not shown in Figure 4A) normally biases push rod 54 into the extended, locked position. However, by moving handle 56 coupled to push rod 54 rearwardly in the direction of arrow 76 against the biasing force of spring 79, cam follower 22a is forced into the unlocked position of Figure 4C. Locking mechanism 18a is thus spring-loaded, such that each locking mechanism is retained in the locked position unless the user moves it to the unlocked position. Pressing the user's thumb against the proximal portion 46 of rim 44 may assist the user while pulling against handle 56.

[044] Once cam follower 22a is in the unlocked position of Figure 4C, the sleeve 50 of the locking mechanism18a can be moved into the interior of handle 12. In one embodiment, upon moving sleeve 50 inwardly within handle 12, shoulder 45 of rim 44 eventually contacts a weight plate (e.g., plate 16a) through which sleeve 50 has been placed. Upon releasing handle 56, the force of spring 79 moves rod 54 such that raised portion 68 of lip 66 moves beneath head 75 of cam follower 22a, such that cam follower 22a is in the locked position of Figure 4B. To unlock cam follower 22a handle 56 is moved rearwardly.

[045] Sleeve rim 44 has a slot through which pin 58 extends. Rim 44 is mounted on sleeve 50 in one embodiment through the use of annular internal ridges 83 on the interior of rim 44 that engage annular grooves 82 of sleeve 50. Optionally, rim 44 may be integral with sleeve 50 or affixed thereto through the use of welding, an adhesive, or other coupling method. Rim 44 may be comprised of plastic, for example. In one

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embodiment, the ridges are smaller than the ridges 83 shown in Figures 4A-4C and are ultrasonically welded into grooves of the sleeve.

[046] With reference now to Figures 6A-6D, cam follower 22a will now be described in additional detail. Cam follower 22a has a substantially L-shaped configuration and comprises a body 74 that has an enlarged head 75 extending therefrom, the head 75 having threads 70 on an upper surface thereof. Body 74 has an aperture 80 therethrough such that cam follower 22a can be rotatably coupled to sleeve 50. A portion 78 of head 75 is wider than body 74 in order to provide additional surface area to engage threads 41 of handle 12.

[047] Teeth 70 are portions of spiral threads and are configured so as to selectively interlock with corresponding threads 41 on the interior surface 40 of handle 12 and such that the cam follower 22a can be selectively threaded out of handle 12 or can be moved out of handle 12 after being moved to an unlocked, lower position as discussed above. A proximal portion of body 74 is rounded so as to rotate freely within sleeve 50.

[048] As shown in Figure 6B, in one embodiment the body 76 of cam follower 22a is notched, having slanted notch 72. In one embodiment the angle of slant 72 is an angle α that is about ten degrees. Also in one embodiment, the angle β is about 26 degrees. However, a variety of different configurations of cam follower 22a are available. Figure 6C shows a rear view of cam follower 22a, featuring the rounded body 76. A top view of cam follower 22a featuring threads 70 is shown in Figure 6D.

[049] Notch 72 of body 74 enables raised portion 68 of the push rod to move back and forth between contact with head 75 or contact with slanted body 74, thereby enabling the push rod to either move the head 75 up or down. Contact with slanted body 74 forces

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head 75 down into the unlocked position, while contact with head 75 forces head 75 into the locked position.

[050] Thus, when locking mechanism 18a is disposed within handle 12, threads 70 of cam follower 22a engage the internal threads 41 of handle 12 unless handle 56 of locking mechanism 18a is pulled away from handle 12. As a major advantage of an embodiment of the present invention, upon firmly twisting the locking mechanism 18a by twisting handle 56 with respect to the handle 12, the threads of a cam follower 22a in the locked position (Fig. 4B) engage the corresponding threads 41 inside handle 12 so tightly that it is impossible, or virtually impossible, for a person to manually pull handle 56 away from handle 12 in the direction of arrow 76. This dynamic of retaining the twisted cam follower 22a within handle 12 provides significant safety to the design, at least substantially preventing handle 56 from being inadvertently pulled away from handle 12 during use of system 10.

[051] Thus, twisting cam follower 22a firmly in one direction tightens threads 70 of cam follower 22a against the interior threads 41 of handle 12 and can at least substantially prevent handle 56 from being pulled in the direction of arrow 76. On the other hand, twisting cam follower 22a in an opposing direction loosens threads 70 of cam follower 22a and enables locking mechanism 18a to be threaded all the way out of handle 12 if desired.

[052] Consequently, if the user desires to prevent handle 56 from being inadvertently moved from handle 12, the user can tighten threads 70 against the internal threads of handle 12 by twisting handle 56 (e.g., approximately a quarter turn in one embodiment). Upon desiring to remove locking mechanism 18a or 18b from handle 12, the user can

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either: (i) twist handle 56 continuously in an opposing direction until mechanism 18a exits handle 12 by threading the cam follower out of handle 12; or can (ii) twist handle 56 until the threads 70 are loosened (e.g., approximately a quarter turn), then pull handle 56 such that the cam follower threads 70 disengage handle 12 and such that the locking mechanism can quickly exit handle 12.

[053] Mechanisms 18a-b are thus reliable, safe, and also readily enable convenient one-handed insertion and/or removal from handle 12. A user can grasp handle 56 with his or her fingers, and press his or her thumb against proximal portion 46 of rim 44, then manipulate handle 56 and its associated locking mechanism as desired.

[054] With reference now to Figure 7A and 7B opposing front and rear views of plate 19a are shown, demonstrating the frusto-conical nesting configuration that enables the plates to nest together and thereby more firmly couple to handle 12. As shown, plate 19a has a conical surrounding surface 90 and a flat interior surface 92 having an aperture therethrough.

[055] In one emobodiment, handle 12 comprises a metal cylindrical handle having a rubber overmold thereon so as to make gripping the handle 12 more convenient.

[056] Although locking mechanisms 18a-b have been featured in association with a dumbbell system, locking mechanisms 18a-b may be readily employed in conjunction with a variety of different systems in which locking an object onto another object is desired, such as in conjunction with a barbell bar on which weight plates are coupled.

[057] The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the

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invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:

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